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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/541,081

03/21/2006

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EXAMINER

DESAI, ANISH P

ART UNIT

PAPER NUMBER

1794

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/541,081	<b>Applicant(s)</b> KIKUCHI ET AL.	
	<b>Examiner</b> ANISH DESAI	<b>Art Unit</b> 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,5-10,16 and 20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5-10,16 and 20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed on 11/13/08 after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/13/08 has been entered.

2. After reviewing Applicant's arguments and prior art as a whole, the 35 USC Section 103(a) rejections based on Takahashi et al. (EP 1 014 766 A2) in view of Watanabe et al. (EP 0 335 337) are withdrawn. Takahashi does not teach or suggest the second layer containing a non-thermoplastic resin and a thermoplastic resin. However, upon further consideration a new 35 USC Section 103(a) rejection based on Watanabe et al. (EP 0 335 337) is made.

3. It is noted that Applicant has deleted recitation "an adhesive" and "a non-adhesive" from the presently claimed invention. It may be helpful if Applicant reinserts aforementioned recitations, because such recitations better characterize Applicant's claimed invention. Moreover, it is noted that Applicant's presently claimed invention controls the liner expansion coefficient of the non-adhesive layer and that of the adhesive layer to about the same level (see paragraph 0026 of US Patent Application Publication 2006/0216502A1 of the present application), whereas the prior art of Watanabe appears to suggest that the individual layers have different coefficient of

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thermal expansion (abstract). Thus, it may be helpful to Applicant if the language of paragraph 0026 is inserted in the presently claimed invention.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 5-10, 16, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. (EP 0 335 337).

6. Watanabe discloses following in abstract:

**⑤ Flexible printed circuit base materials of this invention are composed of at least one layer of polyimide resins of low thermal expansion, at least one layer of polyimide resins of high thermal expansion with a higher linear expansion coefficient than that of the foregoing polyimide resins, and at least one layer of a conductor, highly reliable in dimensional stability to temperature changes, adhesive strength, and flatness after the etching, easy to work with in protection of the circuits made by etching.**

7. Further, at page 3 lines 1-15, Watanabe discloses polyimide film clad with conductor on both sides. Additionally, at page 6 lines 44-50, Watanabe discloses conductor that is formed of copper.

8. The aforementioned disclosure of Watanabe reads on the bonding sheet and a flexible one sided metal-clad laminate.

9. Further, at page 4 lines 25-35, Watanabe discloses that the polyimide resins of high thermal expansion are thermoplastic, which is interpreted to read on Applicant's first layer containing thermoplastic resin. Moreover, at page 5 line 55, Watanabe

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discloses “Where necessary, the polyimide resins of this invention may be blended with other polyimide resins.” Additionally, at page 6 lines 36 to lines 39 with respect to the arrangement of the polyimide resin layers, Watanabe discloses following:

layer of second resins of high thermal expansion in this order can attain the effects of the former two arrangements at the same time. A further arrangement of a conductor, a layer of resins of high thermal expansion, a layer of first resins of low thermal expansion, and a layer of second resins of low thermal expansion with a higher linear expansion coefficient than that of the first can reduce the curling of the film still further. It is possible to build double-sided base materials with conductors on both sides and polyimide

10. As shown below in Table, the aforementioned disclosure of Watanabe (i.e. “A further arrangement of conductor...and a layer of second resins of low thermal...that of the first...curling of the film”) is equated to Applicant’s individually claimed layers.

Layer(s) of EP033537A2 (page 6 lines 36-39)	Equates to Applicant’s Following Layer(s)
A layer of resins of high thermal expansion	First layer containing thermoplastic resin
A layer of resins of <b>first</b> resins of low thermal expansion	Heat resistant film (non-thermoplastic resin)
A layer of second resins of low thermal expansion with a higher liner expansion coefficient than that of the first [i.e. first resins of low thermal expansion]	Second layer containing non-thermoplastic and thermoplastic resin*

\* Based on the rationale provided below

11. It is noted that Watanabe desires that the third layer is “A layer of second resins of low thermal expansion **with a higher liner expansion coefficient than that of the first** [i.e. first resins of low thermal expansion]”. Since, the aforementioned third layer has overall low thermal expansion; it would predominantly be made of a non-thermoplastic resin. Watanabe further desires that the third layer has a **higher liner expansion coefficient than that of the first resins of low thermal expansion layer**.

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12. One can arrive at the formation of the aforementioned third layer by using a particular polyimide resin that has a low thermal expansion with a higher liner expansion coefficient than that of the layer containing the first resins. Alternatively, Watanabe suggests that "Where necessary, the polyimide resins of this invention may be blended with other polyimide resins." (see page 5 lines 55-56). Thus, in order to save cost of having a specific third resin, one can mix a small amount of thermoplastic resin (i.e. resin with high liner expansion coefficient from the first layer with the low linear expansion material from the second layer) in the third layer containing a non-thermoplastic resin (i.e. resin with low liner expansion coefficient) such that the overall expansion coefficient is higher than that of the layer containing the first resins (i.e. resin having low thermal expansion).

13. Further, while Watanabe does not state that such a mixing of thermoplastic and non-thermoplastic layer would result in the layer exhibiting no adhesiveness during thermal lamination, the Examiner respectfully submits that the end effect (i.e. the layer being non-adhesive) due to the mixing of small amount of thermoplastic resin with the non-thermoplastic resin would be the same as that of Applicant's claimed invention. Because, the layer resulting from addition of small amount of thermoplastic resin would still be non-adhesive.

14. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add small amount of thermoplastic resin with the non-thermoplastic resin, motivated by the desire to form the layer of second resins of

low thermal expansion with a higher liner expansion coefficient than that of the first [i.e. a first resins of low thermal expansion].

15. As to the selecting the weight ratio of non-thermoplastic resin to the thermoplastic resin, it would have been obvious to select a suitable weight ratio of non-thermoplastic resin to the thermoplastic resin, motivated by the desire to form the layer of second resins of low thermal expansion with a higher liner expansion coefficient than that of the first [i.e. a first resins of low thermal expansion].

16. Regarding claim limitation of the bonding sheet and one-side metal-clad laminate exhibiting a warpage of 0.5 mm or less, it is respectfully submitted that "Object and Summary of the Invention" section of Watanabe generally discloses that the flexible printed circuit base materials of his invention do not curl, twist, **warp** on application of thermal hysteresis. While Watanabe does not explicitly disclose the warpage of 0.5 mm or less under the conditions as set forth by Applicant; based on the aforementioned disclosure of Watanabe, minimization of warpage would have been obvious and well within one of ordinary skill in the art motivated by the desire to form the bonding sheet and one-side metal-clad laminate.

17. Regarding the claim limitation of the liner expansion coefficient of the bonding sheet, the disclosure of Watanabe in abstract, at page 3 lines 1-15 and at page 6 lines 1-15 is interpreted as Watanabe generally discloses of providing individual layers with different coefficient of expansion such that to control the overall expansion coefficient and dimension stability of the bonding sheet. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a

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bonding sheet having suitable liner expansion coefficient, motivated by the desire to provide dimension stability to the bonding sheet.

18. Regarding claim 8, the disclosure of Watanabe at page 6 lines 44-47 with respect to copper conductor and at page 7 lines 10-15 is interpreted as it would have been obvious to use metal rolls to bond the metal foil onto the bonding sheet, motivated by the desire to form the metal clad laminate.

19. Regarding claim 20, the disclosure of Watanabe at page 5 lines 55-56 with respect to mixing of polyimide resins together with the disclosure at page 5 lines 57-58 and at page 6 lines 1-10 is interpreted as it would have been obvious to one having ordinary skill in the art at the time the invention was made obtain the second layer as claimed, motivated by the desire to form the bonding sheet.

### ***Response to Arguments***

20. Applicant's arguments filed 11/13/08 have been fully considered, but they are moot in view of the new ground of rejections.

### ***Conclusion***

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANISH DESAI whose telephone number is (571)272-6467. The examiner can normally be reached on Monday-Friday, 8:00AM-4:30PM.



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22. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

23. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/  
Supervisory Patent Examiner, Art Unit 1794

/A. D./  
Examiner, Art Unit 1794